

NAME _____ Date _____

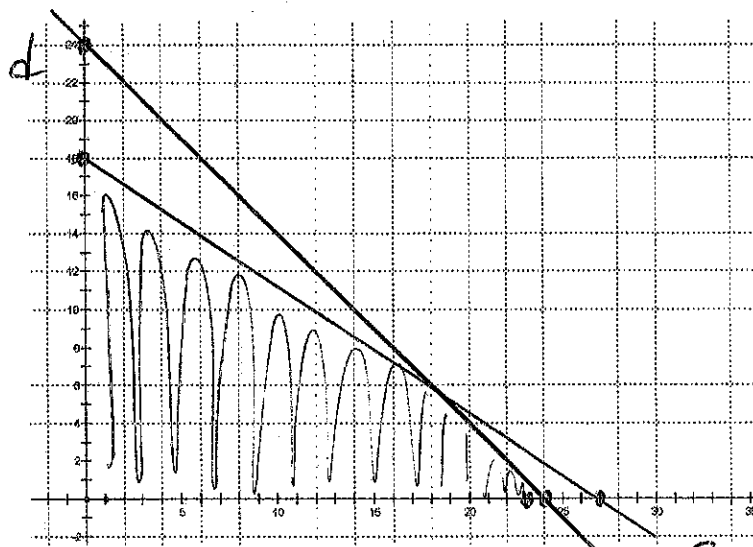
Linear Programming #4

1. A ski manufacturer makes two types of skis and has a fabricating department and a finishing department. A pair of downhill skis requires 6 hours to fabricate and 1 hour to finish. A pair of cross-country skis requires 4 hours to fabricate and 1 hour to finish. The fabricating department has 108 hours of labor available per day. The finishing department has 24 hours of labor available a day. The company makes a profit of \$40 on each pair of downhill skis and a profit of \$30 on each pair of cross-country skis.

- Write a system of linear inequalities to represent the constraints.
- Graph the feasible region.
- Write the objective function for the profit, and find the maximum profit for the given constraints.

$$\begin{aligned} \text{Fab} \quad 6d + 4c &\leq 108 \quad (0, 18) (27, 0) \\ \text{Fin} \quad d + c &\leq 24 \quad (0, 24) (24, 0) \\ d &\geq 0 \\ c &\geq 0 \end{aligned}$$

$P = 30c + 40d$	
0,0	0
0,18	720
24,0	720
18,6	\$780



18 cross
(downhill)

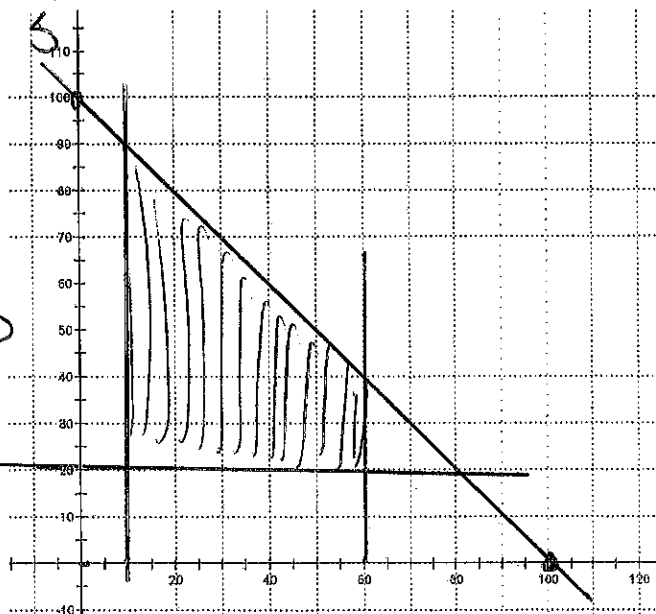
* Note
I graphed on x-axis

2. A small company produces knitted blankets and sweaters and sells them through a chain of specialty stores. The company is to supply the stores with a total of no more than 100 blankets and sweaters per day. The stores guarantee that they will sell at least 10 and no more than 60 blankets per day and at least 20 sweaters per day. The company makes a profit of \$10 on each blanket and a profit of \$12 on each sweater.

- Write a system of linear inequalities to represent the constraints.
- Graph the feasible region.
- Write the objective function for the profit, and find the maximum profit for the given constraints.

$$\begin{aligned} B + S &\leq 100 \\ 10 \leq B &\leq 60 \\ S &\geq 20 \end{aligned}$$

$P = 10B + 12S$	
10,20	$100 + 240 = 340$
10,90	$100 + 1080 = 1180$
60,20	$600 + 240 = 840$
60,40	$600 + 480 = 1080$



B

3. A cereal producer wants to make a breakfast cereal from oats and wheat so that it contains at least 88g of protein and at least 36 mg of iron. The following table gives the amounts of protein and iron per kilogram for each grain.

	Protein	Iron
Wheat	80g	40mg
Oats	100g	30mg

Write and graph a system of inequalities. (Graph oats on x-axis and wheat on y-axis.)

Set up 3 different charts, 1 for each objective function below.

1. If the company wants to minimize the costs, how many kilograms of each grain should the company use if the cost of wheat is \$.30 per kilogram and the cost of oats is \$.40 per kilogram?

2. If the company wants to minimize the costs, how many kilograms of each grain should the company use if the cost of wheat is \$.50 per kilogram and the cost of oats is \$.40 per kilogram?

3. If the company wants to minimize the costs, how many kilograms of each grain should the company use if the cost of wheat is \$.70 per kilogram and the cost of oats is \$.50 per kilogram?

Use feasible

$$x \geq 0 \quad y \geq 0$$

$$100x + 80y \geq 88 \quad (0, 1.1) \quad (0.88, 0)$$

$$30x + 40y \geq 36 \quad (0, 9) \quad (1.2, 0)$$

Oat, wheat

	①	②	③
	$.4x + .3y$	$.4x + .5y$	$.5x + .7y$
0, 1.1	<u>.33</u>	.55	.77
.4, .6	$.16 + .18 = .34$	$.16 + .3 = .46$	$.2 + .42 = .62$
1.2, 0	.48	.48	<u>.60</u>

